FINAL

STACK GAS EMISSION TEST PROGRAM INTERMOUNTAIN POWER PROJECT

UNIT 1

VOLUME 1
STACK GAS EMISSION MONITOR CERTIFICATION TEST PROGRAM

PREPARED FOR:
INTERMOUNTAIN POWER PROJECT
DELTA, UTAH

PREPARED BY:
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ENGINEERING AND RESEARCH DIVISION
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KVB

SUMMARY

Unit #1 is a new steam generator located at the Intermountain Power Project Steam Generating Station in Delta, Utah. This plant is owned and operated by Intermountain Power Project, Delta, Utah (IPP). The stack gas emisslons from Unit 1 are regulated by the United States Environmental Agency (EPA) New Source Performance Standards as set forth in the Code of Federal Regulations (CFR), Title 40, Part 60, Subpart Da and the State of Utah modified approval order dated December 19, 1985. As a requirement of the subpart Da and the regulations of the State of Utah, IPP is required to continuously monitor the stack gas emissions from Unit 1.

To comply with the emission regulations, IPP purchased a continuous emission monitor from KVB, Inc.; Equipment Systems Division, to monitor the stack gas emissions from Unit #1 at the Intermountain Power Project Steam Generating Station. The monitor is composed of a Western Research Model 721A SO_2 Analyzer, a TECO Model 10AR NOx Analyzer, a Thermox Model WDG III Oxygen Analyzer, and a Lear Siegler Model RM-41 Opacity Monitor.

A test program was conducted by KVB, Inc. to demonstrate the ability of the emission monitor to comply with the performance specifications as required by the EPA and the State of Utah. The relative accuracy portion of the test program was subcontracted to Clean Air Engineering, Inc. The test program was conducted in accordance with the procedures outlined in CFR Title 40, Part 60, Appendix B, Performance Specifications 1, 2, and 3 as revised in the Federal Register on March 30, and May 25, 1983.

The monitor, Serial No. 503320, was found to meet all of the performance specifications as required by the EPA and the State of Utah. The requirements for each test and the results are presented in Tables 1 and 2. During the monitor certification test program, the boiler was operated in excess of 50% of normal load except where noted in this document. During the relative accuracy tests the boiler was operated at full load. The certification test program was successfully completed on June 28, 1986.

TABLE 1. SUMMARY OF MONITOR PERFORMANCE TEST DATA

Parameter		Specification Requirement (40 CFR 60, Appendix B)	Monitor Serial No. 503320
PERFORMANCE SPECIFICATION 1 - OPACITY			
Lear Siegler Model RM-41 Opacity Monitor, Serial No. 13616435			
Design Specifications			
Peak Spectral Response		500-600 NM	560 NM
Mean Spectral Response		500-600 NM	567.4 NM
Angle of View		$\leq 5^0$	4^0
Angle of Projection		$\leq 5^0$	3^0
Performance Data			
Calibration Error-	Low	$\leq 3\%$	-.5%
	Mid	$\leq 3\%$	-.4%
	High	$\leq 3\%$	1.4%
Zero Drift (24-hour)		$\leq 2\%$	.39%
Span Drift (24-hour)		$\leq 2\%$	.91%
Response Time		10 sec max	5.6 SEC
Operational Test Period		168 Hr. min	168 Hr.
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PERFORMANCE SPECIFICATION 2 - NOx			
TECO Model 10AR NOx Analyzer, Serial No. 10AR-19309-183 - INLET			
Accuracy			
Volumetric (ppm)		$\leq 20\%$	2.98%
Mass (lb/MBTU)		$\leq 20\%$	2.26%
Zero Drift (24-Hour)		$\leq 2\%$	.05%
Span Drift (24-Hour)		$\leq 2\%$	.57%
Operational Test Period		168 Hrs. min.	168 Hrs.

TABLE 1. SUMMARY OF MONITOR PERFORMANCE TEST DATA cont.

Parameter	Specification Requirement (40 CFR 60, Appendix B)	Monitor Serial No. 503320
TECO Model 10AR NOx Analyzer, Serial No. 10AR-16553-162 - STACK		
Accuracy		
Volumetric (ppm)	≤ 20%	10.04%
Mass (lb/MBTU)	≤ 20%	11.95%
Zero Drift (24-Hour)	≤ 2%	.08%
Span Drift (24-Hour)	≤ 2%	.99%
Operational Test Period	168 Hrs. min.	168 Hrs.
PERFORMANCE SPECIFICATION 2 - SO_2		
Western Research Model 721A, Serial No. 86-721A-6245-3 - INLET		
Accuracy		
Volumetric (ppm)	≤ 20%	6.80%
Mass (lb/MBTU)	≤ 20%	8.83%
Zero Drift (24-Hour)		
High (0-1000 ppm range)	≤ 2%	.39%
Low (0-500 ppm range)	≤ 2%	1.91%
Span Drift (24-Hour)		
High (0-1000 ppm range)	≤ 2.5%	.27%
Low (0-500 ppm range)	≤ 2.5%	1.73%
Operational Test Period	168 Hours Min.	168 Hrs. low range
Western Research Model 721A, Serial No. 86-721A-6245-5 - STACK		
Accuracy		
Volumetric (ppm)	≤ 20%	15.28%
Mass (lb/MBTU)	≤ 20%	16.30%
Zero Drift (24-Hour)		
High (0-1000 ppm range)	≤ 2%	1.57%
Low (0-100 ppm range)	≤ 2%	1.51%
Span Drift (24-Hour)		
High (0-1000 ppm range)	≤ 2.5%	.80%
Low (0-100 ppm range)	≤ 2.5%	1.86%
Operational Test Period	168 Hours Min.	168 Hrs. low range

PERFORMANCE SPECIFICATION 3 - O_2

Thermox WDG-III Oxygen Analyzer, Serial No. C026344-1 - INLET

Zero Drift (24-Hour)	$\leq$0.4% O_2	0.00%
Span Drift (24 Hour)	$\leq$0.5% O_2	0.08%
Accuracy	$\leq$20%	3.14%
Operational Period	168 Hrs. Min.	168 Hrs.

Thermox WDG-III Oxygen Analyzer, Serial No. C026776-1 - STACK

Zero Drift (24-Hour)	$\leq$0.4% O_2	0.00%
Span Drift (24 Hour)	$\leq$0.5% O_2	0.00%
Accuracy	20%	3.68%
Operational Period	168 Hrs. Min.	168 Hrs.

TABLE 2. 24-HOUR DRIFT TABULATIONS
AS PERCENT OF SPAN VALUE (ABSOLUTE VALUES)

INLET

TEST NO.	NOx ZERO (0-1000 ppm)	NOx SPAN (0-1000 ppm)	SO_2 ZERO (0-500 ppm)	SO_2 SPAN (0-500 ppm)	SO_2 ZERO (0-1000 ppm)	SO_2 SPAN (0-1000 ppm)	O_2 ZERO (0-25%)	O_2 SPAN (0-25%)
1.	0	2.5	.7	.6	.1	.6	0	.2
2.	.1	.8	0	3.3	1.3	1.8	0	0
3.	.1	.4	1.2	.2	.3	.4	0	.1
4.	0	.1	.4	.8	0	.5	0	0
5.	.1	.4	.4	.8	.2	.9	0	0
6.	.1	.2	0	0	.2	.1	0	0
7.	0	0	.2	.6	.2	.3	0	.1
8.	0	.7	0	.6	.4	.1	0	.1
9.	.1	0	.4	.8	.1	.4	0	0
10.	.1	.7	.8	.8	0	.3	0	0

LIMITS: NOx & SO_2 $\leq$2.5%, O_2 $\leq$0.5%

NOTE: THE BOILER WAS ON LINE AND OPERATING ABOVE 50% OF NORMAL LOAD FOR THIS SERIES OF DRIFT TESTS EXCEPT WHERE NOTED BELOW.
1. The test period for this drift test series is May 26 through June 5, 1986.
2. Boiler was off line on the following days May 29 & 30, June 1 & 2, 1986.

TABLE 2. 24-HOUR DRIFT TABULATIONS
AS PERCENT OF SPAN VALUE (ABSOLUTE VALUES)

STACK

TEST NO.	NOx ZERO (0-1000 ppm)	NOx SPAN (0-1000 ppm)	SO_2 ZERO (0-100 ppm)	SO_2 SPAN (0-100 ppm)	SO_2 ZERO (0-1000 ppm)	SO_2 SPAN (0-1000 ppm)	O_2 ZERO (0-25%)	O_2 SPAN (0-25%)
1.	.1	2.5	0	1	1.2	2.2	0	0
2.	0	1.2	1	3	.3	.5	0	.2
3.	.1	2.0	6	2	3.1	.9	0	.2
4.	0	.6	2	1	1.0	.3	0	0
5.	0	.4	1	0	1.9	.2	0	0
6.	0	.4	1	0	.2	.2	0	0
7.	0	0.0	2	1	1.7	.9	0	0
8.	0	.5	4	0	1.5	.2	0	0
9.	0	.1	4	2	3.1	.1	0	0
10.	0	.4	3	0	.8	.5	0	0

LIMITS: NOx & SO_2 $\leq$2.5%, O_2 $\leq$0.5%

NOTE: THE BOILER WAS ON LINE AND OPERATING ABOVE 50% OF NORMAL LOAD FOR THIS SERIES OF DRIFT TESTS EXCEPT WHERE NOTED BELOW.
1. The test period for this drift test series is May 26 through June 5, 1986.
2. Boiler was off line on the following days May 29 & 30, June 1 & 2, 1986.

TABLE 2. 24-HOUR DRIFT TABULATIONS
AS PERCENT OF SPAN VALUE (ABSOLUTE VALUES)

INLET

TEST NO.	NOx ZERO (0-1000 ppm)	NOx SPAN (0-1000 ppm)	SO_2 ZERO (0-500 ppm)	SO_2 SPAN (0-500 ppm)	SO_2 ZERO (0-1000 ppm)	SO_2 SPAN (0-1000 ppm)	O_2 ZERO (0-25%)	O_2 SPAN (0-25%)
1.	.1	.7	1.4	.6	.3	.2	0	0
2.	0	.1	1.0	1.0	.2	.3	0	0
3.	0	.1	2.0	2.0	0.0	.3	0	.1
4.	0	.2	.8	1.8	0.0	.3	0	.1
5.	0	.8	.2	1.2	.6	.2	0	0
6.	0	.1	1.8	.6	0.0	.1	0	.1
7.	0	.5	1.4	1.4	.2	.1	0	0

LIMITS: NOx & SO_2 $\leq$2.5%, O_2 $\leq$0.5%

NOTE: THE BOILER WAS ON LINE AND OPERATING ABOVE 50% OF NORMAL LOAD FOR THIS SERIES OF DRIFT TESTS EXCEPT WHERE NOTED BELOW.

1. The test period for this drift test series is June 21 through June 28, 1986.
2. Boiler was off line on the evening of June 25, 1986 for about 3 hrs.

TABLE 2. 24-HOUR DRIFT TABULATIONS
AS PERCENT OF SPAN VALUE (ABSOLUTE VALUES)

STACK

TEST NO.	NOx ZERO (0-1000 ppm)	NOx SPAN (0-1000 ppm)	SO_2 ZERO (0-100 ppm)	SO_2 SPAN (0-100 ppm)	SO_2 ZERO (0-1000 ppm)	SO_2 SPAN (0-1000 ppm)	O_2 ZERO (0-25%)	O_2 SPAN (0-25%)
1.	0	.4	0	1	.6	.3	0	0
2.	0	.3	1	0	2.1	.1	0	0
3.	0	0	0	0	.3	.8	0	0
4.	.1	.6	1	1	.9	.7	0	0
5.	.1	1.5	3	3	1.0	1.0	0	0
6.	.1	1.5	2	3	2.0	.8	0	0
7.	0	.4	1	1	.1	.4	0	0

LIMITS: NOx & SO_2 $\leq$2.5%, O_2 $\leq$0.5%

NOTE: THE BOILER WAS ON LINE AND OPERATING ABOVE 50% OF NORMAL LOAD FOR THIS SERIES OF DRIFT TESTS EXCEPT WHERE NOTED BELOW.

1. The test period for this drift test series is June 21 through June 28, 1986.
2. Boiler was off line on the evening of June 25, 1986 for about 3 hrs.

TABLE 2. 24-HOUR DRIFT TABULATIONS
AS PERCENT OF SPAN VALUE (CORRECTED COMPUTER VALUES)

STACK

TEST NO.	NOx ZERO (0-1000 ppm)	NOx SPAN (0-1000 ppm)	SO_2 ZERO (0-100 ppm)	SO_2 SPAN (0-100 ppm)	SO_2 ZERO (0-1000 ppm)	SO_2 SPAN (0-1000 ppm)	O_2 ZERO (0-25%)	O_2 SPAN (0-25%)
1.	0	0.1	1.0	1.0	1.2	1.3	0	0
2.	0	0.2	1.0	1.0	0.5	0.6	0	0
3.	0	0.6	0	1.0	0.2	0.4	0	0
4.	0	1.0	1.0	2.0	0.5	1.1	0	0
5.	0	0.2	1.0	1.0	0.3	0.1	0	0
6.	0	0.1	0	1.0	1.0	1.5	0	0
7.	0	0.3	1.0	1.0	1.0	0.3	0	0

LIMITS: NOx & SO_2 $\leq$2.5%, O_2 $\leq$0.5%

NOTE: THE BOILER WAS ON LINE AND OPERATING ABOVE 50% OF NORMAL LOAD FOR THIS SERIES OF DRIFT TESTS EXCEPT WHERE NOTED BELOW.

The test period for this drift test series is November 27 through December 3, 1986.